Impact of Superman Evolutionary Scheme on Central Executive, Insight Problem Solving and Math Fluency of Foundational and Preparatory Levels Children

Synopsis

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1.0 INTRODUCTION

Using numbers is an integral part of life to perform various tasks like money management, time management, shopping, paying bills, and many more. National Achievement Survey (2022) reports that 38.8% of students in grade III cannot solve their daily life mathematical problems. ASER report (2022), showed that only 21% of students in grade V and 41.6% of grade VIII can solve arithmetic problems. ASER report (2018) showed that only 43% of students solve arithmetic questions at grade V level and likewise merely 28% of students of grade V students are able to solve questions based on division operation. These findings indicate a decline in the proficiency of students in solving arithmetic problems between 2018 and 2022. The low percentages suggest that a significant portion of students is not achieving expected levels of competency in basic arithmetic operations. What is the reason students do not solve these daily life mathematical problems? The reason might be math fluency.

Math Fluency

Math fluency refers to the aptitude for quickly and accurately solving basic math problems (Gliksman, 2022). It encompasses the ability to select and employ appropriate methods and strategies in order to solve math problems (Jakes, 2023). By enhancing cognitive processing speed, math fluency empowers students to tackle intricate problems while directing their attention toward reasoning-based queries. The acquisition of math fluency enables children to employ their skills effectively, thereby discerning the optimal approach to deducing mathematical problems (Yeh et al., 2014). A crucial facet of math fluency is the development of numerical acuity, which enables individuals to discover the most suitable method for a given task, as well as to utilize their skills across various contexts (Jakes, 2023). The National Curriculum mandates that pupils should achieve fluency in the fundamentals of mathematics through repeated and diverse practice (DFE, 2013). During the early years of schooling, math fluency progresses with learning and practice, necessitating a shift in strategies as children mature. Initially, math facts are ascertained using fingers or physical objects, employing a "counting all" approach (Geary, 2014). Subsequently, children employ the "counting-on strategy" by counting up from one of the operators in the problem (e.g., 4 + 3 is counted as 4-5-6-7). Eventually, children employ arithmetic principles and grasp their knowledge of other combinations, employing decomposition strategies such as knowledge-related facts or breaking down numbers into constituent parts (e.g., 7 + 5 = 7 + 3 + 2) (Gliksman, 2022).

The resolution of arithmetic problems requires the utilization of various cognitive processes and strategies, wherein for simple sums, the answer may be directly retrieved from memory (Hubber et al., 2014) and children retrieve solutions from their long-term memory (Cowan et al., 2011). Extensive research in the realm of mathematical cognition reveals that children employ multiple strategies to solve arithmetic problems (Lemaire, 1997; Siegler, 2007). Inefficient utilization of strategies is linked to children's poor performance in mathematics (Zhang et al., 2014). The extent to which children employ strategies is influenced by various factors, including cognitive abilities such as working memory (Steel & Funnell, 2001). Research conducted in the domain of mathematics education and problem-solving benefits from incorporating the aspect of Gestalt-inspired insight (Yeh et al., 2014).

Insight Problem Solving

Kohler first coined the term “insight” in 1925 to describe the learning of his apes (Mascaro et al., 2021). According to Kohler, Sultan suddenly found the solution after huddled for some time over his earlier, fruitless attempts to get to the bananas. This finding encouraged Kohler and other Gestalt psychologists to begin a comprehensive study program on what they dubbed the "Aha" experience or insight. (Duncker, 1945; Koffka, 1935; Wertheimer,1959). It is the moment of "aha" or "I get it" when a problem is suddenly solved (Mayer, 1992). When a non-solver discovers a solution, they typically understand it immediately and experience a sense of amazement at how simple it is—something like an "aha!" moment. (Wittgenstein, 1958). Insight is commonly defined as a process where an individual undergoes a sudden realization regarding the solution to a novel problem (Schooler et al.,1995; Sheth et al., 2009). This process involves rearranging some components of a person's mental representation of different stimuli, circumstances, or events to yield an interpretation that is nonobvious or non-dominant. (Beeman et al., 2014). Insight is characterized by distinct phases that differentiate it from other cognitive processes involved in problem-solving, it involves a particular subjective experience characterized by a moment of surprise and joy, often expressed as the "aha" or "eureka" moment (Bowden et al., 2005). Insight is significant because it has been connected to creativity and scientific discoveries (Finke,1995). Creativity manifests during the early stages of problem-solving through the utilization of divergent thinking, by generating and linking a variety of ideas (Macgregor,2011). Researchers found a relationship between working memory capacity and the ability to solve insight

problems (Zhou et al., 2022). Executive control plays an important role in achieving creative insights (Dreu et al., 2012). The central executive hinders the stage of insight by solving insight problems (Polina, 2019). The process of insight problem solving requires the use of working memory storage, and executive control is important prior to the solution (Korovkin et al ., 2018).

Central Executive

Central executive serves as the core component of working memory and plays a supervisory role in the regulation and control of the cognitive process (Li et al., 2018). It facilitates in task organization, directing attention, switching between various elements, and prioritizing activities (Cabe et al., 2011). The central executive assumes the responsibility of organizing the simultaneous retention and manipulation of numerical data, which plays a crucial role in a diverse range of numerical processing activities (Qi et al., 2022). Correlation between central executive and fundamental numerical processing, investigations has ascertained that it is linked to performance on numerous numerical processing tasks. These tasks encompass both non symbolic and symbolic number comparisons, as well as number line estimation (Friso-van den Bos et al., 2014). Studies have concentrated on examining the association between central executive components, such as inhibition, switching, updating, and dual-task coordination, and the utilization of strategies. For example, one study found that central executive load disrupts the implementation of a mental computation strategy (Imbo and Vandierdonck, 2007). Another study disclosed that inhibition and shifting act as mediators in the age-related disparities in strategy selection (Hodzik and Lemaire, 2011). Additional research has demonstrated that dual-task coordination affects the efficiency of strategy execution in estimation (Li et al., 2016; Huang et al., 2016). Exposure to nature-based practices contributes to the advancement of executive functions in preschool-aged children (Ernst, 2022). Providing young learners with opportunities to engage in nature-based education augments cognitive functioning (Brodrick, 2022). Studies have indicated that physical activity interventions have a beneficial impact on executive functions (Sung et al., 2022). Prior research has shown that acute exercise does not influence mathematical, verbal, and spatial insight creativity (Jung et al., 2022).

Superman Evolutionary Scheme

The Superman Evolutionary Scheme was launched in April 2017 by Revered Professor Prem Saran

Satsangi, Chairman of the Advisory Committee on Education, Dayalbagh. The children in the age group of 3 weeks to 12 years enrolled in the Superman Evolutionary Scheme are exposed to diverse activities for holistic development in natural set up i.e. agroecology cum precision farming fields. They learn and educate themselves by doing, observing, exploring, and interacting with peers and nature. Parents, pre-primary school teachers, primary school teachers, and pre-service elementary prospective teachers are involved in the planning and execution of activities for young learners. Health experts (pediatricians) monitor their growth and development parameters. Development of young learners is not limited to one area; it includes all domains (physical, cognitive, emotional, social, and spiritual) for their holistic development. The NCF 2023 emphasizes the need for a holistic approach to education that promotes the overall development of students. It included developing student's physical, emotional, social, and cognitive skills. The Superman Evolutionary Scheme is not limited to one area; it covers each dimension ranging from physical, social, cognitive, emotional, and spiritual making it holistic. Since the children from 489+1 centers across the world are connected, the cultural program covers a wide range of local, national, and international programs. Besides learning Hindi, English, and Sanskrit. The concept of "Superman" is not new directly or indirectly it is mentioned in philosophical texts (Satsangi, 2017). Superman in Aristotle's tale does not put himself in unnecessary danger since he doesn't give things enough thought. Even though he is aware that there are situations in which life is not worth living, he is nevertheless willing to give his life in times of extreme need. Kindness is a sign of supremacy, according to Aristotle, whereas receiving is a sign of servitude (Satsangi, 2017). Explaining this as a deficiency in the character of Aristotle's Superman, Revered Prof. Prem Saran Satsangi Sahab elucidates, "One may not like to be shown mercy by anyone else but one should beg for mercy from the Lord Almighty. Accordingly, if one is free from egotism, one would not be shy to beg for the mercy of Radhasoami Dayal (The Supreme Being). Whatever our Superman may be, he would behave in an extremely humble manner."(Satsangi, 2017). The term "Superman" has been significantly used by Friedrich Nietzsche, he is not a system builder, but he aims at provoking thought. From his point of view, man is in continuous movement towards actualization. Revered Prof. Prem Saran Satsangi Sahab emphatically states, "Our concept of Superman is a new one - unique, incomparable, and unparalleled." the concept of Superman in Dayalbagh differs from Nietzschean and Shavian concepts, Revered Prof. Prem Saran Satsangi Sahab

writes, “But in Satsang, we believe that as far as the spirit entities are concerned, all of them came into existence at the beginning of the creation itself.”

1.1 EMERGENCE

Over the past few years, there has been a notable transformation in how people of different age groups, particularly those in late childhood, lead their lives. In contrast to children of previous decades, contemporary kids progressively adopt more sedentary habits, largely characterized by substantial periods spent using computers and watching television (Bluma et al., 2018). This particular lifestyle choice leads them to disregard the importance of engaging with natural environments and participating in physical activities, which could potentially hinder their overall development. It would seem that for younger students in primary school, engaging in physical activities within natural surroundings is both common and beneficial (Brodrick et al., 2022). The benefits of such activities may be partially attributed to the physical growth and coordination that occurs during this particular age range, as well as the inherent drive that children possess to engage in play and exploration (Fjortoft, 2004). The brain undergoes a steady process of development during the prenatal and early postnatal periods, which are widely regarded as the most vulnerable phases to the potential effects of environmental exposures (Grandjean, 2014). However, certain cognitive functions that are closely associated with learning and academic achievement, such as working memory and attention, undergo development across childhood and adolescence and are considered essential components of cognitive maturation (Anderson, 2002; Ullman, 2014). Numerous studies have demonstrated a close relationship between children's physical growth, motor development, and cognitive development (Kantomaa et al., 2013; Happala et al., 2014). Various cognitive skills, including visuospatial skills and memory skills, contribute to the learning of arithmetic (Zhang, 2017; Lowrie, 2017). Peng and colleagues (Peng et al., 2018) propose that deficits in processing speed and working memory are salient cognitive markers of mathematical difficulties that persist across different age groups. Children who experience difficulties with working memory tend to encounter challenges in their academic pursuits, particularly in subjects such as mathematics (Alloway, Gathercole, Kirkwood & Elliot, 2009). Research conducted in the field of mathematics has demonstrated that solving arithmetic problems necessitates the utilization of a range of cognitive processes and strategies; for simpler calculations, the answer may be directly retrieved from memory (Hubber et al.,

2014), while children employ multiple strategies to solve more complex arithmetic problems (Lemaire, 1997; Siegler, 2007). Poor performance in mathematics among children has been found to be associated with inefficient utilization of strategies (Zhang et al., 2014). Several factors contribute to children's utilization of strategies, including cognitive skills such as working memory (Steel & Funnell, 2001). Research conducted in the realm of mathematics education benefits from adopting a perspective inspired by the Gestalt theory of insight (Yeh et al., 2014). For these problems, the researcher explores answers to questions as follows:

Q.1 What is the impact of the Superman Evolutionary Scheme on the central executive of foundational level children?

Q.2 What is the impact of the Superman Evolutionary Scheme on insight problem solving of foundational level children?

Q.3 What is the impact of the Superman Evolutionary Scheme on the math fluency of foundational level children?

Q.4 How does the central executive differ between boys and girls in the Superman Evolutionary Scheme of the foundational level?

Q.5 How does insight problem solving differ between boys and girls in the Superman Evolutionary Scheme of the foundational level?

Q.6 How does math fluency differ between boys and girls in the Superman Evolutionary Scheme of the foundational level?

Q.7 What is the impact of the Superman Evolutionary Scheme on the central executive of preparatory level children?

Q.8 What is the impact of the Superman Evolutionary Scheme on insight problem solving of preparatory level children?

Q.9 What is the impact of the Superman Evolutionary Scheme on the math fluency of preparatory level children?

Q.10 How does the central executive differ between boys and girls in the Superman Evolutionary Scheme of the preparatory level?

Q.11 How does insight problem solving differ between boys and girls in the Superman Evolutionary

Scheme of the preparatory level?

Q.12 How does math fluency differ between boys and girls in the Superman Evolutionary Scheme of the preparatory level?

1.2 JUSTIFICATION

There is a growing interest in the impact of natural surroundings on learning, particularly in educational settings. The potential of nature to reduce cognitive strain, alleviate stress, and enhance overall well-being makes it a conducive factor for the learning experience (Brodrick et al., 2022).

Research on regular exposure to green environments for individuals of all ages provides insight into strategies for reducing attention difficulties and supporting academic development (Faber Taylor and Kuo, 2011; Tallis, et al., 2018; Wu et al., 2014). For younger students in primary school, engaging in physical activities in nature is both common and beneficial. These benefits may stem from the physical development and coordination that occur during this stage of life, as well as their innate drive to play and explore (Fjørtoft, 2004). Exposure to nature-based practices also contributes to the enhancement of executive functions in preschool-aged children (Ernst, 2022). Incorporating nature-based education into the learning process for young learners improves cognitive functioning (Brodrick, 2022). Studies have shown that physical activity interventions have a positive impact on executive functions (Sung et al., 2022). Studies also revealed that physical activity interventions improves mathematical performance of children and has no negative impact on performance (Sneck et al., 2019). During the preschool period, these skills play a crucial role in supporting school readiness and mathematical abilities (Bull et al., 2008; Clark et al., 2010). The relationship between early executive functions and later academic achievement is quite strong (Traverso et al., 2015). Therefore, it is important to develop the executive functions (working memory and inhibitory control) of children at an early age. However, there has been limited research specifically focused on the preschool years, during which executive functions undergo significant improvement (Wass et al., 2012). Most studies have targeted school-age children (Jaeggi et al., 2008; Henry et al., 2014; Karbach et al., 2014, as cited in Blakey & Carroll, 2015), with a particular emphasis on working memory training. Previous research has also shown that the brain develops steadily during the prenatal and early postnatal periods, which are considered to be the most vulnerable stages for the effects of environmental exposures (Grandjean,2014). However, certain cognitive functions

closely related to learning and academic achievement, such as working memory and attention, develop throughout childhood and adolescence as part of cognitive maturation (Anderson,2002). The findings of nature-based interventions have indicated that physical activity not only benefits children's physical and mental health but also enhances their academic performance (Ashcraft, 2002; Wang et al., 2019; Hermassi et al., 2021). While research in this area has covered various academic subjects (e.g., language, mathematics, spelling, reading, science, and geography), mathematics has received the most attention and yielded diverse results (Sibley and Etnier, 2003; Esteban-Cornejo et al., 2015; de Greeff et al., 2018; Bedard et al., 2019; Barbosa et al., 2020). Undoubtedly, mathematics holds an irreplaceable position as a fundamental and crucial discipline. Preschool-aged children have demonstrated the capability to successfully complete tasks pertaining to arithmetic operations that can be resolved through the utilization of a familiar approach (Hornburg et al., 2018; Kyttälä et al., 2014; Martin et al., 2014). A limited number of investigations have also suggested that young children may possess the ability to tackle more challenging mathematical problem-solving tasks that necessitate the integration and application of multiple arithmetic operations (Carpenter et al., 1993). Generally speaking, engaging in physical activity proves to be an effective means of enhancing both physical and mental well-being. Extensive research has demonstrated that physical activity has the potential to yield significant benefits in terms of cognitive performance, learning, brain structure, and brain function, thus serving as a foundation for improved academic achievement (Donnelly et al., 2016). Notably, evidence suggests that physical activity positively impacts physiological aspects such as executive function (EF), consequently leading to better academic performance (Álvarez-Bueno et al., 2017; de Greeff et al., 2018; Ishihara et al., 2018b).Existing studies have shown that intervention in natural environments can enhance cognitive development, physical development, self-regulation, academic achievement, and socio-emotional development (Brodrick, 2022; Johnstone, 2022; Sneck et al., 2019). In a systematic review by (Buczylowska et al., 2023), it was found that the effect of natural walks and natural environments interventions on children aged 4 to 17 exhibited a positive influence on cognitive functions (Johnson et al., 2019; Schutte et al., 2017; Stevenson et al., 2019 and Bijnens et al.,2022) School-aged children displayed notably superior performance compared to preschoolers (Schuttle et al., 2017). On the other hand, research revealed that there was no difference in children's cognitive functions post-play activities

in green areas versus gray spaces among 7-year-olds (Anabitarte et al., 2021). Similarly, no difference was observed in executive network performance between 13 to 15-year-olds attending schools with increased greenery in their yards and those in control schools (Kelz et al., 2013). Another study found no difference between natural outdoor settings and indoor laboratory rooms on attention and inhibitory control (Torquati et al., 2017). Studies also found that spending time in green areas doesn't seem to have a stronger impact on one specific area of cognitive function compared to other cognitive domains (Buczylowska et al., 2023). From the contradictory results, further research is needed, in both observational studies and experiments studies (Buczylowska et al., 2023). In this research, the Superman Evolutionary Scheme children spend two hours in the morning and two hours in the evening. They participate in diverse activities in agroecology-cum-precision farming fields. This research seeks whether the participation of children in diverse activities influences cognitive functions and mathematical performance in children. It is essential to consider potential challenges that may arise, such as disruptions to sleep patterns and other external factors that may hinder cognitive development. By exploring both the potential benefits and obstacles associated with this scheme, this research aims to provide valuable insights into its overall impact on the cognitive development of children. In conclusion, conducting research on the Impact of the Superman Evolutionary Scheme on the cognitive development of children is vital for understanding how exposure to diverse activities in natural settings can affect executive functions and mathematical performance. By examining both the positive effects and potential challenges, this research can inform educational practices and interventions aimed at promoting holistic development in children. To address the existing research gaps, this present study seeks to explore the following inquiries: Firstly, what is the impact of the Superman Evolutionary Scheme on the central executive, insight problem solving, and math fluency of children at the foundational level? Secondly, what is the impact of the Superman Evolutionary Scheme on the central executive, insight problem solving, and math fluency of children at the preparatory level? It is important to note that the researcher did not encounter any studies that could adequately answer these questions, hence the necessity of conducting the present study to obtain equitable answers.

1.3 STATEMENT OF THE PROBLEM

Impact of Superman Evolutionary Scheme on Central Executive, Insight Problem Solving and Math

Fluency of Foundational and Preparatory Level Children.

1.4 DEFINITIONS OF THE TERMS

1. Superman Evolutionary Scheme

In a present study holistic development initiative introduced by Prof. Prem Saran Satsangi Sahab in which children enrolled at the age of 3 weeks to 12 years are exposed to diverse activities in natural set up i.e. agroecology-cum-precision farming fields is known as Superman Evolutionary Scheme.

2. Math Fluency

In the present study, Math fluency is the ability to solve arithmetic problems quickly and accurately (i.e. addition, subtraction, multiplication, and division) (Gliksman, 2022).

2. Insight Problem Solving

Insight in problem solving is typically associated with the sudden realization of a solution that appears correct (Kounios et al., 2006).

3. Central Executive

The central executive is responsible for controlled processing in working memory, including but not limited to, directing attention, maintaining task goals, decision-making, and memory retrieval (Cabe,2011).

5. Foundational Level Children

In the present study foundational level children are those who are currently enrolled in an educational program from pre-primary to grade 2 and are ages 3 to 8 years. This is in accordance with NEP 2020.

6. Preparatory Level Children

In the present study, preparatory level children are those who are currently enrolled in an educational program from grade 3 to grade 5 and are ages 9 to 11 years. This is in accordance with NEP 2020

1.6 OBJECTIVES OF THE STUDY

1.To study the impact of the Superman Evolutionary Scheme on the insight problem solving of foundational level children.

2.To study the impact of the Superman Evolutionary Scheme on the central executive of foundational level children.

3.To study the impact of the Superman Evolutionary Scheme on the math fluency of foundational level

children.

4.To compare the math fluency of boys and girls enrolled in the Superman Evolutionary Scheme at the foundational level.

5.To compare insight problem solving of boys and girls enrolled in the Superman Evolutionary Scheme at the foundational level.

6.To compare the central executive of boys and girls enrolled in the Superman Evolutionary Scheme at the foundational level.

7.To study the impact of the Superman Evolutionary Scheme on insight problem solving of preparatory level children.

8.To study the impact of the Superman Evolutionary Scheme on the central executive of preparatory level children.

9.To study the impact of the Superman Evolutionary Scheme on the math fluency of preparatory level children.

10.To compare the math fluency of boys and girls enrolled in the Superman Evolutionary Scheme at the preparatory level.

11.To compare insight problem solving of boys and girls enrolled in the Superman Evolutionary Scheme at the preparatory level.

12.To compare the central executive of boys and girls enrolled in the Superman Evolutionary Scheme at the preparatory level.

1.7 HYPOTHESES OF THE STUDY

$H_0$1: There will be no significant impact of the Superman Evolutionary Scheme on the insight problem solving of foundational level children.

$H_0$2: There will be no significant impact of the Superman Evolutionary Scheme on the central executive of foundational level children.

$H_0$3: There will be no significant impact of the Superman Evolutionary Scheme on the math fluency of foundational level children.

$H_0$4: There will be no significant difference in the math fluency of boys and girls enrolled in the Superman evolutionary Scheme at the foundational level.

$H_0$5: There will be no significant difference in the insight problem solving of boys and girls enrolled in the Superman Evolutionary Scheme at the foundational level.

$H_0$6: There will be no significant difference in the central executive of boys and girls enrolled in the Superman Evolutionary Scheme at the foundational level.

$H_0$7: There will be no significant impact of the Superman Evolutionary Scheme on the insight problem solving of preparatory level children.

$H_0$8: There will be no significant impact of the Superman Evolutionary Scheme on the central executive of preparatory level children.

$H_0$9: There will be no significant impact of the Superman Evolutionary Scheme on the math fluency of preparatory level children.

$H_0$10: There will be no significant difference in the math fluency of boys and girls enrolled in the Superman evolutionary Scheme at the preparatory level.

$H_0$11: There will be no significant difference in the insight problem solving of boys and girls enrolled in the Superman Evolutionary Scheme at the preparatory level.

$H_0$12: There will be no significant difference in the central executive of boys and girls enrolled in the Superman Evolutionary Scheme at the preparatory level.

1.8 VARIABLES OF THE STUDY

Independent Variable

1.Superman Evolutionary Scheme

Dependent Variables

1.Central Executive

2.Insight Problem Solving

3.Math Fluency

1.9 DELIMITATION

1.The present study will be delimited to the Agra city.

2.The present study will be delimited to the schools of Dayalbagh.

3.The present study will be delimited 320 students out of which 160 students enrolled in Superman Evolutionary Scheme and 160 students not enrolled in Superman Evolutionary Scheme.

1.10 METHOD OF THE STUDY

The present study will be carried out using the Descriptive Survey method.

1.11 POPULATION OF THE STUDY

The population of the present study is foundational and preparatory level children (pre-primary to grade V) schools of Dayalbagh. The age group of the population is 3 to 11 years.

1.12 SAMPLE OF THE STUDY

In the present study, 2 schools of the foundational level and 2 schools of the preparatory level will be selected by using purposive sampling. The school will be selected on the basis of the availability of at least 50 students enrolled in the Superman Evolutionary Scheme, and at least 50 students not enrolled in the Superman Evolutionary Scheme across 6 to 11 years. A total of 320 students will be selected by using simple random sampling out of which 160 students will be selected from 2 schools of foundational level, 80 students from each school. Similarly, 160 students will be selected from 2 schools of preparatory level, 80 students from each school.

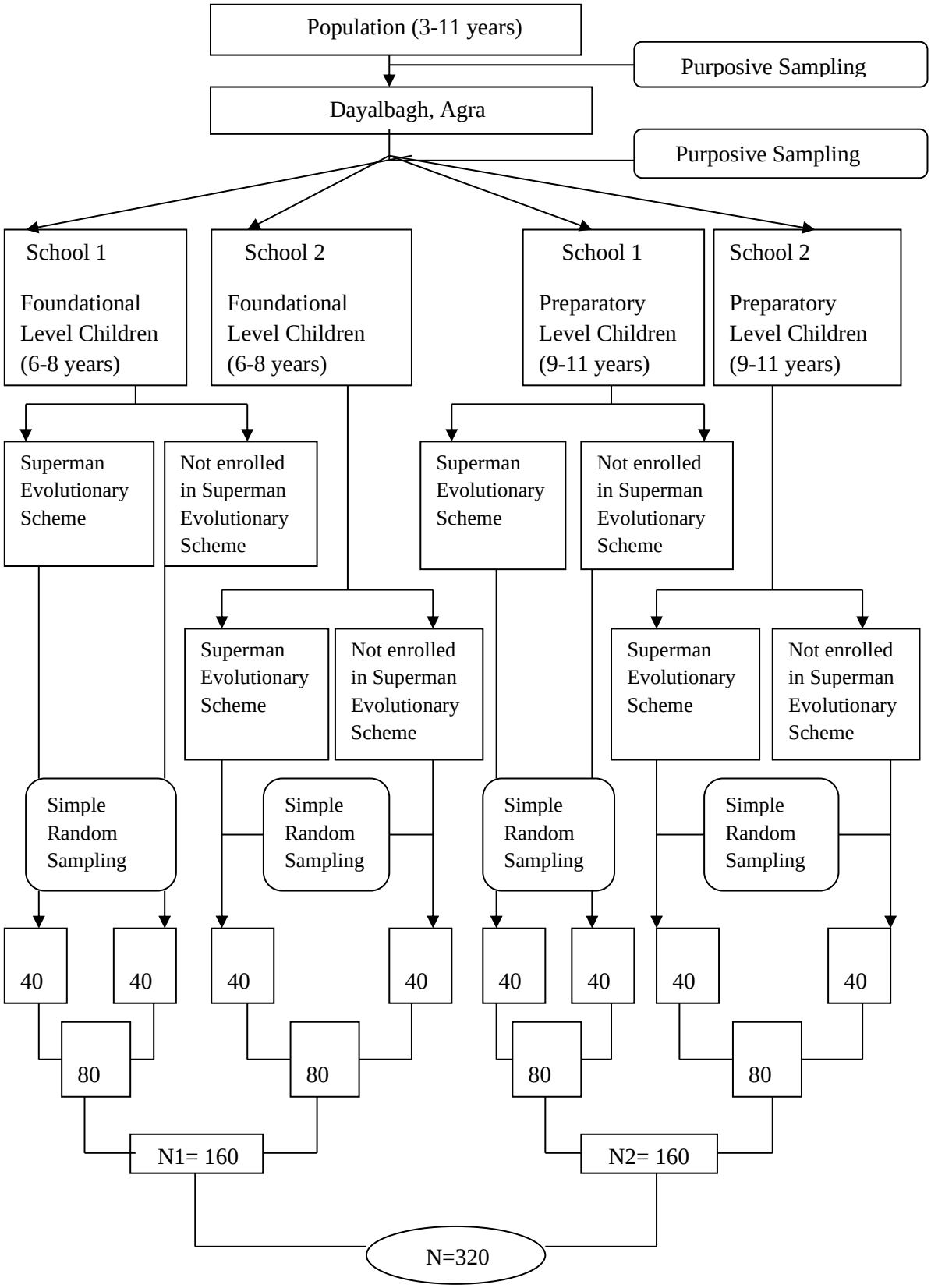

Figure 1. Sample of the Study

1.13 TOOLS OF THE STUDY

1. Math Fluency (Ben-Gurion University Math Fluency Test): The BGU-MF test is a computerized math fluency test in the future. The test includes simple math exercises of the four operations: addition, subtraction, multiplication, and division. Exercises in addition and subtraction will use numbers between 0 and 20 (e.g., 7 + 6). Multiplication and division exercises will be taken from the multiplication table (up to 10 X 10; e.g., 56 ÷ 7). The exercises will appear one by one on the screen, and participants will be instructed to press the key in their answers. The difficulty level of questions is according to the grade level of the children.

2. Central Executive (n-back task): In the n-back task, participants will be presented with a sequence of stimuli one by one. For each stimulus, they need to decide if the current stimulus is the same as the one presented N trials ago. Letters will be presented on screen for 500 ms followed by a 2500 black period. In total participants get 3 seconds (500 ms + 2500 ms) to respond if the letter matches the letter trials ago.

3. Insight Problem Solving (Matchstick Arithmetic Puzzle): In this task, the participants will be presented with a picture of a matchstick puzzle. They are required to solve the equation by moving only one stick. This task is a classic tool that can be used to assess insight problem solving (Knoblich, 2001).

1.14 STATISTICAL TECHNIQUES

The following statistical techniques will be used in the study:

Descriptive Statistics

(i) Mean (ii) Standard deviation

Inferential Statistics

t-test: In the present study the t-test will be utilized for objectives (1-6). It is a statistical analysis commonly used in research, that will be employed in this study to determine the significance of the difference between children enrolled in the Superman evolutionary scheme and children who are not enrolled in the Superman evolutionary scheme of the foundational and preparatory levels children. The aim is to ascertain whether there is a significant difference between these two groups (central executive, insight problem solving, and math fluency). By conducting the t-test, the researchers will be able to analyze the data and determine if the observed difference is statistically significant or merely due to

chance.

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